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### METHOD OF OPERATION INDIVIDUAL LINE CIRCUIT.

Schematic For Full Mechanical Switching System.

#### GENERAL DESCRIPTION.

1. This circuit is used on an individual line switch for passing calls originated by dial subscribers in a full mechanical switching system. It is individual to the line and is arranged to handle regular subscribers or P.B.X. lines on a flat, coin or message register basis.

2. The main functions of this line switch are: (1) it serves as a connecting link between the subscriber's station set and the district sender selector; (2) it provides a means for disconnecting the line relay battery bridge from the talking circuit on terminating connections.

#### DETAILED DESCRIPTION.

##### OPERATION.

###### A (1) ORIGINATING CALLS.

3. When the subscriber removes the receiver from the switchhook, the L relay operates over a circuit from battery through the 500 ohm winding of the relay, break contact of the CO relay, over the line loop and subscriber's set, to ground on the break contact of the (CO) relay. With the L relay operated, a circuit is closed which operates the 200 A selector and starts a line switch hunting for an idle selector. The circuit for operating the selector is traced from ground on the first terminal and the TR line switch bank, (switch in normal position) through the test brush, make contact of the L relay, break contact of the CO relay, break contact, armature and winding of the (STP) magnet to battery through the 52 ohm W.L. resistance. The stepping magnet is energized, opening its own contact, whereupon it steps the switch one step on its back stroke. This stepping continues until a district test terminal is reached on which battery is found. The test lead (TR) of the district selector when busy, is connected to ground and when normal, to battery through approximately 53 ohms.

4. When an idle district test terminal is reached, (on which battery is found) the CO relay operates, aided by the battery through the stepping magnet up to the point where its circuit is opened by the operation of the CO relay. The stepping magnet will not operate through the high resistance path to ground through the 475 ohm winding of the L relay, so that no further stepping occurs. (The 475 ohm winding of the L relay through which the CO relay operates is provided to insure the holding of its contacts until the CO relay is fully operated). The CO relay operated locks through its 100 ohm winding and make contact, winding of the message register (which remains normal) brush and terminal of the DS line bank, to battery through the 475 ohm winding of the SL relay to the district selector circuit (not shown). The operation of the CO relay also

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disconnects battery and ground from the tip and ring leads and connects them through to the district selector circuit. The ST relay in the seized district selector operates on ground through the CO relay, disconnecting battery from the test terminal and substituting ground in order to make the test terminal busy to other hunting line switches. Ground on the test terminal of the selected district selector shunts the 475 ohm winding of the L relay which releases, the CO relay remaining operated until the end of conversation.

5. When in use on an originating call the line switch is made busy to terminating calls by battery being connected to lead S. The S lead is carried thru the off normal brush of the FS line switch bank with the result, that when the switch has stepped out of its normal position, the S lead is connected to battery thru either a high resistance (2200 ohms), for P.B.X. lines, except the last one of the group, or a low resistance (600 ohms) for regular subscriber's lines and the last line of a P.B.X. group. After the seized district selector has functioned, a dial tone is sent back to the calling subscriber as an indication that the circuit is closed thru for dialing, after which the subscriber dials the desired number.

#### A (2) RELEASING THE SWITCH.

6. On all originating calls the line switch is released by direct action of the district selector. When the receiver is replaced on the switchhook at the calling station the district selector functions removing battery from the DS lead thus releasing the CO relay. The release of the CO relay closes a circuit from battery thru the stepping magnet, break contact of the CO relay, break contact of the L relay, to ground on the off normal brush of the ST line bank. The stepping magnet operates over this circuit thus stepping the line switch back to normal. If the calling station desires to originate a new call during the return of the line switch, the operation of the L relay will cause the switch to begin hunting for a district selector from whatever position it is in at that instant, without returning to normal. The message register is caused to operate by a greatly increased flow of current from the associated district selector when the receiver at the calling station is replaced on the switchhook. The circuit for operating the #5-R message register is traced from battery in the connected district selector, over lead DS, thru DS line bank terminal and brush, winding of the #5-R message register, make contact and 100 ohm winding of the CO relay to ground.

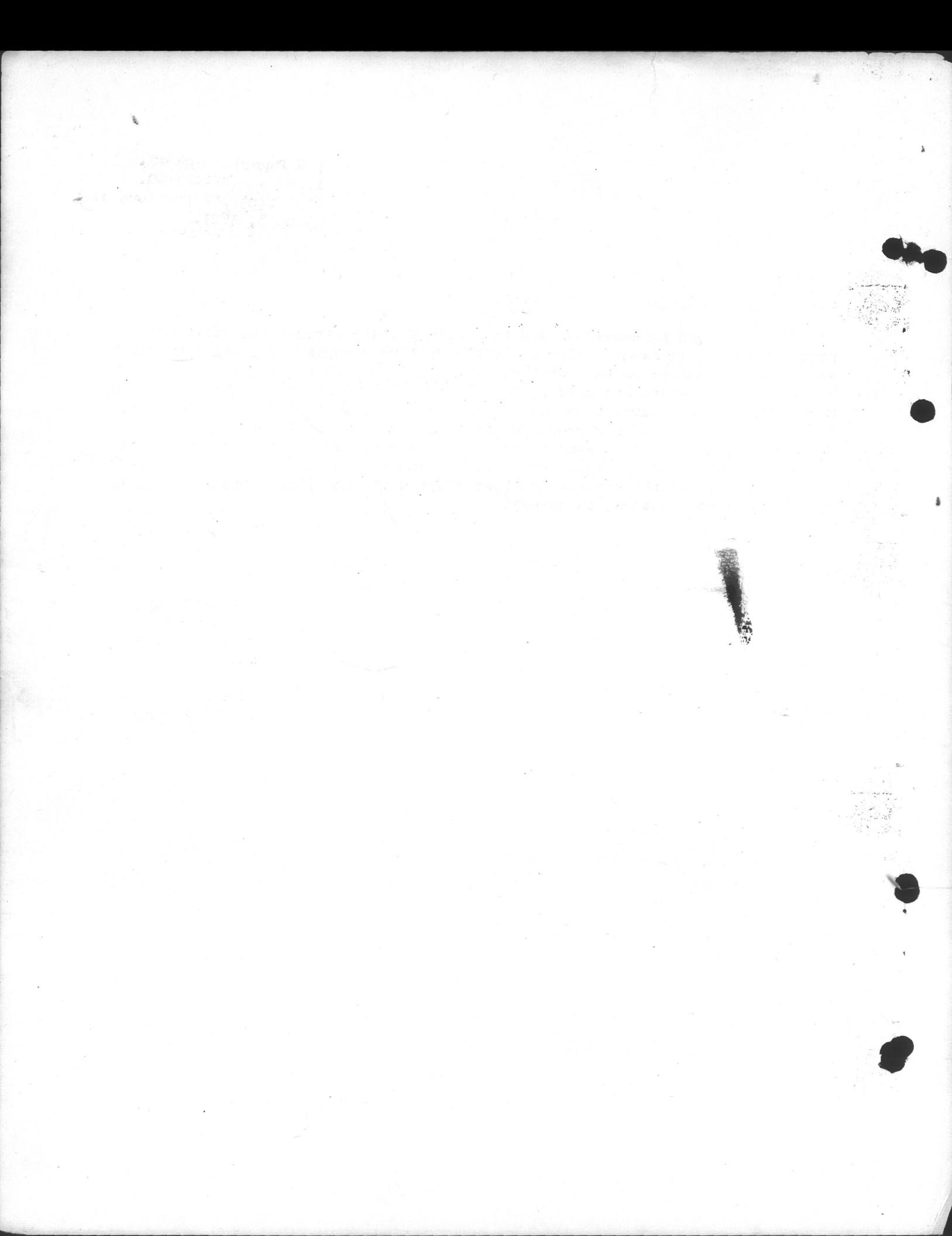
#### A (3) TERMINATING CALLS.

7. When the final selector is connected with an idle line switch, battery is connected to the sleeve lead S, brush and normal terminal of the FS line switch bank thru one or both windings of the CO relay, which operates. The operation of the CO relay disconnects the line relay battery bridge from across the tip and ring of the circuit. When the final selector returns to normal, the CO relay releases restoring the circuit to normal. A line switch held by a final selector is made busy to other final selectors by battery placed on the S lead by the holding final selector.

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A (4) CABLE FAILURE.

8. In circuits provided with the cable failure circuit the first off normal terminal is reserved for the cable failure circuit. This test terminal is normally grounded so that the bridging hunting brush (TR) passes by. If however, many senders are held by lines from which no dialing pulses have been received, all the district selectors involved are made busy for a short time, battery is substituted for ground on the cable failure test terminals, the lines are dismissed and caused to brush on their cable failure terminals. In this event, the CO relay locks over the DS terminal to battery thru the #18-AP resistance. After the trouble has been cleared all the line switches involved are released and restored to normal.



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CIRCUIT REQUIREMENTS

	<u>OPERATE</u>	<u>NON-OPERATE</u>	<u>RELEASE</u>
E424 500 ohm wdg. (L)	Test .018 amp. Readj. .017 amp.	Test .010 amp. Readj. .011 amp.	Hold: Test .014 amp.
475 ohm wdg.	Hold: Test .031 amp.		
E425 (CO) Wdgs. in series.	Test .033 amp. Readj. .031 amp.	Test .015 amp. Readj. .016 amp.	Hold: Test .019 amp.
100 ohm wdg.	Test .088 amp.	Test .036 amp.	Hold: Test .0525 amp. Readj. Inner wdg. .050 amp.
#5-R Message Register	Test .165 amp.	Test .135 amp.	Hold: Test .057 amp.

ENG. --- CAL-RV-FF.  
3/23/22.

CHK'D. --- FAB.

APPROVED - C.L. SUYTER, G.M.L.

EXPLANATION OF CHARTS